

REMARKS

Claims 89-94 and 99-110 are pending in the present application. In the Office Action dated October 4, 2004 the Examiner rejected claims 89-94 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,261,958 to Crevasse et al. ("Crevasse") or U.S. Patent No. 6,244,941 to Bowman ("Bowman"), individually, or in combination with U.S. Patent No. 5,325,261 to Horowitz ("Horowitz"). Claim 99 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Bowman patent or in combination with the Horowitz patent. Claims 100-110 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Crevasse patent or the Bowman patent, individually, or in combination with the Horowitz patent.

The embodiments disclosed in the present application will now be discussed in comparison to the cited references. Of course, the discussion of the disclosed embodiments, and the discussion of the differences between the disclosed embodiments and the cited references, do not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

The embodiments disclosed in the present application are generally directed to methods and apparatuses for releasably attaching a polishing pad to the platen of a planarization machine used to planarize a semiconductor wafer. In one embodiment, the platen of the planarization machine may include a conductive plate positioned within the platen that may be connected to an electrical signal source. The planarization medium may further include a support member that has a polishing pad attached to the support member. The electrical signal source may be a voltage capable of charging the conductive plate so that a planarization medium positioned adjacent to the conductive plate may be electrostatically attracted to the platen while the voltage is applied. As a result, the pad is retained on the platen by electrostatically attracting the support member to the platen. The support member may optionally include a locking device that engages a mating portion formed in the platen that resists vertical and/or lateral motion of the support member relative to the platen.

Another embodiment includes a polishing pad having a plurality of conductive particles distributed within the pad that may be electrostatically or electromagnetically attracted to the platen. When the polishing pad is electromagnetically attracted to the platen, the electrical signal source includes an electrical current that passes through the conductive plate to produce

the attractive force between the platen and the particles distributed in the polishing pad. The particles may be distributed in the pad in a uniform manner, or they may be non-uniformly distributed. For example, the particles in the pad may be concentrated in a portion of the pad that is adjacent to the platen in order to enhance the electromagnetic or electrostatic attractive forces between the pad and the platen.

The Examiner has cited the Crevasse patent, which discloses an electromagnetic polishing pad retention apparatus. Referring in particular to Figure 3 of the Crevasse patent, an electromagnet 54 is positioned within a platen 40 that is coupled to a current source through a switch 56. The polishing pad 32 is attached to a backside layer 36 that is formed of a magnetic material, such as a thin steel sheet. Accordingly, the backside layer 36 is attracted to the platen 40 when the electromagnet 54 is connected to the current source through the switch 56. The layer 36 is disclosed as a substantially planar member that is detachable from the platen by interruption of the current.

The Crevasse patent makes no mention of retaining the layer 36 on the platen 40 using electrostatic attractive forces. Furthermore, the Crevasse patent fails to disclose or fairly suggest that the layer 36 may be replaced by a plurality of conductive particles distributed in the pad 32. The Crevasse patent also does not disclose or fairly suggest that an electrostatic attractive force and an electromagnetic attractive force are interchangeable equivalents.

The Examiner has cited the Bowman patent. The Bowman patent similarly discloses an electromagnetic polishing pad retention apparatus. Referring to Figure 6, a plurality of electromagnetic elements 338 are positioned in the platen 328 that are coupled to a current source through a switch 340. A top plate member 332 is positioned on the platen 328, that further includes a polishing pad 326 that is attached to a surface of the member 332. When a current is applied to the electromagnetic elements 338, an electromagnetic attractive force is developed between the top plate member 332 and the platen 328.

The Bowman patent, however, also fails disclose or fairly suggest that the member 332 may be replaced by a plurality of conductive particles distributed in the pad 326, or that the polishing pad may be retained on the platen by electrostatic attractive forces. Furthermore, the Bowman patent does not disclose or fairly suggest that an electrostatic force and an electromagnetic force are interchangeable equivalents.

The Examiner has also cited the Horwitz patent. The Horwitz patent discloses an electrostatic holding device for holding a semiconductor wafer 10 during operations, such as vacuum sputtering and etching. The Horwitz patent does not disclose or fairly suggest employing an electrostatic force to hold a planarizing medium. Again, as with the Crevasse and the Bowman patents, the Horwitz patent does not disclose or fairly suggest that an electrostatic force and an electromagnetic force are interchangeable equivalents.

There is no motivation or suggestion in the Crevasse patent and the Bowman patent to substitute using an electrostatic attractive force in place of an electromagnetic attractive force for coupling a planarizing medium to a platen. The Crevasse patent and the Bowman patent rely on only using an electromagnetic force for retaining a polishing pad on a platen. Modifying the Crevasse patent and the Bowman patent to use an electrostatic attractive force, as disclosed in the Horwitz patent, would alter the fundamental operating principal of the Crevasse patent and Bowman patent and, therefore, teaches away from such a modification. See, M.P.E.P. § 2145(X)(D).

The Examiner has asserted that the use of an electrostatic attractive force and an electromagnetic attractive force are known interchangeable equivalents. However, in order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art. See, M.P.E.P. § 2144.06. Furthermore, the equivalency cannot be based upon the Applicants' disclosure or the mere fact that the two different types of attractive forces might be functional equivalents. See, M.P.E.P. § 2144.06. The Examiner has not pointed out any specific evidence from the Crevasse patent, the Bowman patent, or the Horwitz patent that shows that the cited references recognize or suggest either expressly or implicitly that the use of an electrostatic attractive force to retain a wafer and an electromagnetic attractive force to removably attach a planarizing medium to a platen are interchangeable equivalents. The only purported evidence used to show the equivalence between the use of an electrostatic attractive force and an electromagnetic attractive force is that the Applicants' disclosure purportedly discloses that either type of attractive force would work equally as well. However, even assuming that the Applicants disclose the purported equivalency of the two types of attractive forces, equivalency cannot be established based upon the Applicants' disclosure. Reliance on

the Applicants' disclosure to show equivalence would be using impermissible hindsight. See, M.P.E.P. § 2144.06.

The main test for equivalents is that the element present in the prior art must perform substantially the same function in substantially the same way to achieve substantially the same result. See, M.P.E.P. § 2183. In order to be an equivalent, the electrostatic attractive force must perform substantially the same function in substantially the same way to achieve substantially the same result as an electromagnetic attractive force. Assuming that an electrostatic attractive force and an electromagnetic attractive force perform substantially the same function and achieve substantially the same result, the way that the function is achieved is substantially different. An electromagnetic force is generated by the passing of a current through a conductor to generate a magnetic field. The magnetic field acts upon a ferromagnetic material in order to develop any sizeable attractive force. In contrast, electrostatic forces are generated in the absence of the movement of a current, relying instead upon the imposition of a voltage that is calculated to generate the requisite degree of attraction. Therefore, an electrostatic attractive force is generated by a different physical process than an electromagnetic attractive force. Accordingly, an electrostatic attractive force is generated in a substantially different way compared to an electromagnetic attractive force, and, therefore, is not an equivalent to an electromagnetic attractive force. Furthermore, the cited references do not disclose or fairly suggest equivalence between the two attractive forces.

There is also no motivation or suggestion in the cited references to position conductive particles within the planarizing medium of the Crevasse patent or the Bowman patent. The Examiner has asserted that the Horwitz patent discloses electrodes positioned within a chuck for retaining a wafer 10. However, the Examiner has not provided a convincing line of reasoning as to why one of ordinary skill in the art would modify the Crevasse patent or the Bowman patent by distributing conductive particles in a planarizing medium. The Applicants do not understand how this would preserve the lifetime of the conductive material as asserted by the Examiner. Such a modification of the Crevasse patent and the Bowman patent would be the result of impermissible hindsight.

Turning now to the claims, the patentably distinct differences between the cited references and the claim language will be specifically pointed out. Claim 89 recites in part,

“...applying a signal to the platen that produces *an electrostatic attractive force between the platen and the planarizing medium.*” (Emphasis added). As noted above, the combination of the cited references do not disclose or even fairly suggest removably attaching the polishing pad by producing an electrostatic attractive force between the polishing pad and the platen. In addition, as also noted above, electrostatic and electromagnetic forces cannot reasonably be regarded as equivalents as asserted by the Examiner. Claim 89 is therefore allowable over the cited references. Claims depending from claim 89 are also allowable due to depending from an allowable base claim and further in view of the additional limitations recited in the dependent claims.

Claim 100 recites in part, “...*distributing a plurality of conductive particles in the planarizing medium...and...applying a signal to the platen that produces an electromagnetic attractive force between the platen and the conductive particles in the planarizing medium.*” (Emphasis added). The combination of the cited references do not disclose or even fairly suggest a distribution of conductive particles in the planarizing medium. Instead, the Bowman patent and the Crevasse patent disclose a plurality of electromagnetic elements positioned within a platen that attract a top plate member formed of a magnetic material. The polishing pad is then attached to the top plate member. The Horwitz patent discloses electrodes positioned within the chuck, but does not disclose or fairly suggest positioning electrodes within a planarizing medium, and, in fact, makes no mention of using a planarizing medium. The Examiner has not set forth a convincing line of reasoning as to why one of ordinary skill in the art would place conductive particles or electrodes within the planarizing medium of the Crevasse patent or the Bowman patent. Any modification of the cited references is the result of impermissible hindsight. Therefore, claim 100 is allowable over the cited references. Claims depending from claim 100 are also allowable due to depending from an allowable base claim and further in view of the additional limitations recited in the dependent claims.

Claim 107 similarly recites in part, “[a] method for releasably attaching a *planarizing medium having a plurality of internally distributed conductive particles* to a platen of a planarization machine, comprising...positioning the planarization medium adjacent to the platen...and...coupling a signal to the platen *to produce an electromagnetic attractive force between the conductive particles and the platen.*” (Emphasis added). Again, the combination of

the cited references do not disclose or even fairly suggest a planarizing medium having conductive particles internally distributed. Claim 107 is therefore allowable over the cited references. Claims depending from claim 107 are also allowable due to depending from an allowable base claim and further in view of the additional limitations recited in the dependent claims.

All of the claims remaining in the application (claims 89-94 and 99-110) are now clearly allowable. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,

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